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**CONSUMERS' WILLINGNESS TO PAY FOR
ECO-CERTIFIED WOOD PRODUCTS**

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ABSTRACT

We use Kriström's simple spike model to assess the factors influencing consumers' willingness to pay a premium for a variety of certified wood products. A survey of over 1600 Pennsylvania and Tennessee residents found that approximately 35% were willing to pay some positive "premium" for environmentally certified wood products. For three types of wood products (a \$28.80 shelf, a \$199 chair, and a \$799 table) we find the estimated market premiums to be \$3.74, \$15.94, and \$45.07, respectively.

JEL codes: Q13, Q23

Key words: eco-labeling, eco-certification, spike models, price premium

CONSUMERS' WILLINGNESS TO PAY FOR ECO-CERTIFIED WOOD PRODUCTS¹

Introduction

During the past several years, forest certification programs have attracted increased interest in the United States. Both the Forest Stewardship Council, an international non-profit organization that accredits third party certifiers, and the American Forest & Paper Association (AF&PA), an industry organization, operate environmental certification programs. The primary purposes of these programs are to improve environmental quality and to promote sustainable forest management (Cabarle, *et al.* 1995). Major home improvement chains such as Home Depot and Lowe's have committed to these programs by giving preferences to certified wood products, purchasing specific proportions of their wood products from firms or organizations that have had their forest management and production practices monitored and certified.

Certification programs must be economically feasible for growers and manufacturers if they are to succeed. The production and marketing practices in certified growing, harvesting, manufacturing, and/or handling must either be cost competitive with uncertified methods or consumers must be willing to pay a price-premium for the costlier certified products. The purpose of this study is to ascertain consumers' willingness to pay a premium for environmentally certified products. While other researchers have examined this issue, this study differs from previous eco-labeled wood products studies in several ways. In particular, our data are based on a representative sample of the population, we follow the recommendations of Arrow et al. (1993) more closely in that a dichotomous choice referendum valuation question based on a statistically efficient bid design is used, and we incorporate recently proposed

¹Funding for this study was provided in part by a grant from the USDA Forest Service Wood Education and Resources Center. Further support was provided by the Tennessee and Utah Agricultural Experiment Stations.

methods to mitigate hypothetical bias on the part of respondents.² Secondly, the analysis uses a “spike” modeling approach that accounts for the preponderance of people who are not willing to pay a premium for certified wood products. The three products studied were an oak shelving board, an oak chair, and an oak table. Results from the study were obtained through a telephone survey of over 1600 Pennsylvania and Tennessee residents.

Survey Data and Methods of Analysis

Survey Data

The survey consisted of two parts. First, a telephone survey was conducted to assess whether respondents would be willing to pay a premium for environmentally certified wood products and, thus, participate in the market. For the second part of the survey, an information booklet regarding certification of hardwood products was sent to those who said they would be willing to participate in the market. A follow-up phone call was used to collect information from these respondents regarding their willingness to buy any of three certified wood products at a specified premium. All respondents were aged 18 or older. The caller requested that the person most responsible for the household’s wood product purchases respond. Phone calls were placed until at least 800 completed surveys were obtained in each state. The University of Tennessee Human Dimensions Lab conducted the survey under the supervision of the project researchers, following the standard survey procedures recommended by Dillman (2000).

Residents of six Pennsylvania and six Tennessee counties were randomly sampled from telephone lists. Both Tennessee and Pennsylvania are major hardwood producing states in the

²As such our study differs from much of the current literature. For example, Ozanne and Vlosky (1997) and Winterhalter and Cassens (1993) restrict their sample to only those households with relatively high incomes (greater than \$30,000 and greater than \$50,000, respectively). Forsyth et al. (1999) do not define any specific wood product, just the broad category of “wood products”. Rametsteiner (1999) did not link willingness to purchase certified wood products to anything other than price. Spinazze and Kant (1999) presented respondents with a “percentage premium” instead of how a premium would be encountered by a market consumer, i.e., a higher price.

U.S. In addition, Pennsylvania has the largest number of certified hardwood acres of any state in the U.S. (Jacobsen, 2000; Pennsylvania Hardwood Development Council, 2001). The counties were chosen on the basis of whether they had high (low) concentrations of hardwood removals and were rural (urban). In each case, the urban counties had population densities of greater than 500 people per square mile, and hardwood removals of less than 2 million cubic feet per year. The rural counties had population densities of less than 75 persons per square mile (Census Bureau), and hardwood removals of 10 million cubic feet per year or greater (Timber Product Output Database Retrieval System). Urban counties with low hardwood output included Allegheny, Northampton, and Montgomery counties in Pennsylvania and Davidson, Hamilton, and Knox counties in Tennessee. Rural counties with high hardwood output included Clearfield, Elk and McKean counties in Pennsylvania and Hardeman, McNairy, and Wayne in Tennessee. The 1614 residents surveyed were divided almost equally across states (811 and 803 Pennsylvania and Tennessee respondents, respectively) and county types (809 and 805 rural and urban counties, respectively).

Two versions of the survey were used. One version included a “full” scope of certification, while the other included a “partial” (growing and harvesting only) scope of certification. The text for the certification programs was as follows

“Full” Program

Environmental certification means a product has passed a voluntary environmental screening process by an independent third party organization, not the wood products company, the wood products industry, or the government. All aspects of production, including timber growing and harvesting, product manufacturing, and handling methods, are monitored to ensure that practices are used that help sustain our environment for current and future generations. A product label assuring certification appears on or nearby the product.

“Partial” Program

Environmental certification means a product has passed a voluntary environmental screening process by an independent third party organization, not the wood products company, the wood products industry, or the government. Timber growing and harvesting methods are monitored to ensure that practices are used that help sustain our environment for current and future generations. Product manufacturing and handling would not be monitored or certified. A product label assuring certification appears on or nearby the product.

Each respondent was randomly assigned to the “full” or “partial” certification treatment. Some 816 respondents completed the “full” certification survey and another 798 respondents completed the “partial” certification” survey. Following Ozanne, et al. (1999), the certifying entity was an independent third party organization, not the wood products company, the wood products industry, or the government.

In the initial phone call, after the caller read the certification text respondents were asked to indicate which of the following three statements most closely reflected their opinions about environmental certification of hardwoods:

“I support environmental certification and would pay a higher price for hardwood products if they were certified”.

“I support environmental certification but not if it requires paying a higher price for hardwood products”.

“I do not support environmental certification regardless of whether it costs me anything”.

By allowing respondents to express support for environmental certification without being willing to pay higher prices, bias associated with “yea saying” may be minimized (Blamey, Bennett, and Morrison 1999). In other words, pressure to provide a “socially responsible” response of support for the environment may be decreased, perhaps providing a more realistic estimate of consumers’

behavior in the marketplace. Demographic data were also collected, as well as information regarding membership in environmental or conservation organizations, and frequency of recreation in forests.

In identifying themselves with one of the above statements, respondents separated themselves into market participants (willing to pay a higher price) and non-participants (not willing to pay a higher price). Those who indicated willingness to pay a non-zero premium for eco-labeled hardwood products during the first phone call were asked to participate in a second round survey. Of the 1,614 original survey respondents, 516 (32%) were eligible for and agreed to participate in a second round survey. These respondents were sent a survey booklet describing in detail the definition and scope of the certification process as well as pictures and product descriptions for each of three products. The three products were an oak shelving board, the uncertified version of which sold for \$28.80, an oak chair, the uncertified version of which sold for \$199, and an oak table, the uncertified version of which sold for \$799.³ Immediately adjacent to the picture and description of the uncertified wood product was a picture of an identical, yet certified, product. No price for the certified product was printed in the booklet; this price was stated at the time of the second telephone interview.

The booklet also defined environmental certification using both text and a graphic to depict the scope of the certification (Figure 1). For the “full” scope certification program, it was indicated that certification would occur at the timber growing and harvesting stage, product manufacturing stage, and the product handling stage. The “partial” scope certification program indicated that only the timber growing and harvesting stage would be certified.⁴ An example of

³The pictures were taken of uncertified products offered at a major chain store in Knoxville, Tennessee. Actual market prices were used for the uncertified products.

⁴Of course, the scope of certification described in the booklet and follow-up phone call matched that described in the initial phone contact.

a certification label that would be displayed near eco-labeled products was also included (Figure 2). The certification label was placed adjacent to the picture of the certified product, while the picture of the uncertified product had no label. The certified and uncertified products were indicated as being identical in all characteristics except certification.

The respondents receiving the booklet also were asked to read a section on making hypothetical choices. A page of text reassured respondents that some people might be willing to pay more for environmentally certified products, while others might not. The text also described hypothetical bias and the problems it may cause when providing market information to the wood products industry. Respondents were asked to “carefully consider the choices” and think about “those for which you would truly be willing to buy and pay.” The purpose of these statements was to mitigate the potential effects of hypothetical bias (Cummings and Taylor 1999). Following Arrow et al. (1993), the text of the booklet contained a statement asking respondents to carefully consider their budget constraint. During the second phone call, the respondents were verbally reminded to carefully consider their budget constraint and to make as realistic a choice as possible in a hypothetical situation (Kotchen and Reiling 1999).

In the second phone call, the respondents were asked to refer to the product description, picture, and price contained in the booklet.⁵ The price premium, or additional cost, for each product was selected randomly from a set of five levels.⁶ Respondents were asked to indicate which product (certified, uncertified, or neither) they would be willing to purchase at the given

⁵The order in which the products were referenced by the interviewer was random, though respondents could peruse the booklet prior to the phone call and anticipate questions for three wood products.

⁶The price premiums for the certified shelving board were [\$1.50, \$4, \$5, \$6, \$10]; for the certified chair the premiums were [\$10, \$15, \$20, \$25, \$40]; for the certified table the premiums were [\$25, \$45, \$50, \$55, \$60]. Following Boyle et al. (1998), the responses regarding premiums were obtained through an open-ended pricing question for each product on the pre-test survey. Pre-test respondents were provided with product pictures and descriptions identical to those provided in the field survey. Responses to the pre-test were used to generate statistically efficient bid values for use in the field survey.

attributes, including price. Respondents were requested to answer the questions only if they were in the market for the products, either now or in the future. Respondents were also instructed to say they would buy neither product if they would never consider purchasing a product similar to that shown.⁷

Methods of Analysis

The simple spike model of Kriström (1997) is used to examine people's willingness to pay for eco-certified wood products. The model provides a spike in the WTP distribution at zero to account for "non-participants", where non-participants are those respondents stating that they did not support certification of wood products, or that they did support certification but only if the additional cost was zero. "Participants" are those who, in principle, are willing to pay some non-zero premium for certified wood products. Further, the model does not allow for a negative willingness to pay. Given a price premium the respondent is willing to pay, say P , the distribution of WTP is given by,

$$(1) \quad \begin{aligned} F_{WTP}(P) &= 0 && \text{if } P < 0 \\ &= 1/[1 + \exp(\alpha X)] && \text{if } P = 0 \\ &= 1/[1 + \exp(\alpha X - \beta P)] && \text{if } P > 0 \end{aligned}$$

where the parameters of $F_{WTP}(\cdot)$ are estimated via maximum likelihood. The vector X represents all factors other than price that are believed to influence WTP and β is the coefficient on the premium faced by the respondent. The likelihood function consisting of three parts: those who are not willing to pay a positive premium (non-participants), those who are willing to pay a non-zero premium but the posted price is greater than their willingness to pay, and those who are willing to pay a non-zero premium and whose willingness to pay exceeds the posted price.

⁷Those stating they would buy neither the certified or uncertified products were dropped from the econometric model for that product. Some 1.6% would not buy a product similar to the shelf, 3.5% would not buy a product similar to the chair, and 4% would not buy a product similar to the table.

While this model is not a standard feature of “canned” econometric packages, the log-likelihood function can be estimated in statistical software packages such as LIMDEP, as we have done, or any package that permits one to program a likelihood function.⁸ Mean WTP is given by,

$$(2) \quad WTP = \ln[1 + \exp(\alpha X)] / \beta$$

where β is the price coefficient. The spike model requires $\beta > 0$, that is, a positive marginal utility of income.

The “full” certification program was hypothesized to have a positive influence on market participation relative to the “partial” certification program. This was anticipated because the potential positive environmental effects of the “full” certification would be throughout the market channel versus only at growing and harvesting. Based on findings from previous studies, those living in an urban area and females were hypothesized to be more likely to have a non-zero WTP relative to those who did not have these characteristics. Further, those who contribute to environmental advocacy organizations (e.g., Sierra Club, The Nature Conservancy) or hunting/fishing conservation organizations (e.g., Ducks Unlimited), and those who frequently recreate in forested areas were hypothesized to have non-zero WTP for certified wood products relative to those who did not share these characteristics because these measures may reflect values the respondents place on the environment and forest resources. Those with previous experience in purchasing environmentally labeled products were believed to be more likely to pay a positive premium for eco-labeled wood products.

Results

Of the 1,614 respondents participating in the survey, 973 provided complete information

⁸LIMDEP code is available from the authors.

needed for the study (Table 1).⁹ Just under 31% supported certification and were willing to pay a non-zero premium for eco-certified wood products. Some 57% supported certification but were not willing to pay higher prices and 12% did not support certification regardless of costs.¹⁰

The estimated spike models for each of the products are presented in Table 2.¹¹ The results were consistent across the various products with the same variables being significant in each of the models. Thus, the initial discussion with respect to hypotheses concerning any one variable applies to all products. Those who make donations to environmental organizations (*Environmental Advocate*) and who use national forests frequently (*Forest User*) are more likely to have a non-zero WTP relative to those who do not share these characteristics. Contrary to expectations, those who make donations to hunting or fishing organizations (*Hunting/Fishing Advocate*) are no more likely than others to have a positive WTP. Residents of Tennessee were not significantly different from residents of Pennsylvania in willingness to pay a premium for environmentally certified wood products.

In terms of demographic factors, males were less likely than females to be willing to pay a non-zero premium for certified wood products, a result that is congruent with other studies. The likelihood a respondent was willing to pay a premium increased with age; residents living in urban counties were more willing to pay a non-zero premium relative to residents of rural counties. Those who had purchased environmentally certified products in past (*Bought Eco-*

⁹The large drop in observations is due to the telephone-mail-telephone structure; it proved difficult to get an eligible respondent to complete a second round interview.

¹⁰Some commonly cited reasons for not supporting certification were that the respondent did not believe certification would work to improve the environment, other causes were of higher priority, and companies should be regulated rather than using voluntary certification. Some commonly cited reasons for not being willing to pay more were that the respondent could not afford to pay more, they did not believe it costs more, or that manufacturers should not charge higher prices even if it costs more.

¹¹Models including income were estimated but none of the income coefficients were significantly different from zero implying that income effects were not present. We temper this conclusion due to because of relatively high degree of item non-response to the income question. Models with income as a variable are available upon request.

Certified Products in Past) were more likely to pay a positive premium for certified wood products. With respect to “treatment” variables, the scope effect is not present. That is, respondents presented with the “full” certification scenario were no more willing to pay a premium than those respondents presented with the “partial” certification scenario, all else equal. Finally, as the price premium increased, respondents were less likely to pay the non-zero premium.¹²

The models presented in Table 2 were used to calculate unconditional estimates of WTP that can be applied to the population as a whole. Relative to the \$28.80 uncertified oak shelving board, respondents were willing to spend, on average, an additional \$3.74 for a certified board. This represents a 13.0% premium over an uncertified board. The 95% confidence interval for the premium is between \$2.92 and \$4.56.¹³ Turning to the oak chair, respondents were willing to pay an additional \$15.94 for a certified product, relative to a \$199 uncertified chair. This corresponds to an 8.0% premium and a 95% confidence interval of \$12.22–\$19.66. Finally, respondents were willing to pay an additional \$45.07 for the certified oak table relative to the \$799 uncertified oak table, a 5.6% premium. The 95% confidence interval on the estimate was \$33.53–\$56.61. The declining premium as the product price increases is a feature found by more than one study.

Conclusions

As with the study by Grönroos and Bowyer (1999), the results from this study show that

¹²Recall the WTP distribution of equation (1), in which the β coefficient is multiplied by minus one. Thus, WTP a premium varies inversely with the magnitude of the premium.

¹³The variance of the conditional willingness to pay estimates was calculated using the delta method (Greene, 2000):

$$Var(WTP) = (\partial WTP / \partial \Gamma') Var(\Gamma) (\partial WTP / \partial \Gamma)'$$

where WTP is given by equation 2, the Γ parameters are estimated via maximum likelihood, and $Var(\Gamma)$ is the variance-covariance matrix of the model.

the majority of consumers would not be willing to pay a premium for certified products. The data indicate that just under 31% percent of consumers would be market participants for certified hardwood products. This percentage is much lower than findings from studies by Ozanne and Vlosky (1997) and Winterhalter and Cassens (1993), who report that 60 to 80 percent of the sample would be willing to pay a premium, and very close to Stevens *et al.* (1998) whose survey of manufacturers reports a West Coast market of 28% of manufacturers' customer base. One possible explanation for the lower participation in an eco-certified market in this study may be that respondents were allowed to express support for environmental certification without having to pay a premium, therefore "yea saying" bias may have been reduced. We also note that this finding satisfies one of Sedjo and Swallow's (2002) conditions for the emergence of separate certified and non-certified wood products markets. These authors show that a two-price market, *i.e.*, a certified market at one price and a non-certified market at another price, requires "significant new demand" (p.282). Our results suggest that the certified market, while smaller than that found in previous studies, is still substantial.¹⁴

The profile of those most likely to be willing to pay a premium includes females and older respondents, as well as those who contribute to environmental advocacy groups. Further, frequent forest users and those who have bought eco-certified products in the past were also more willing to pay a non-zero premium. This profile is similar to findings from previous studies.

The willingness to buy a certified product over an uncertified one is responsive to the premium level (price). Converted to percentages, the mean premium for the oak shelving board

¹⁴The other condition found by Sedjo and Swallow is that the cost of certification must be positive to all or most suppliers to this market. Stevens *et al.* (1998) indicate that certification costs are indeed positive, about 5.4% increase in the cost of certified goods sold over the cost of non-certified products.

was 13.0%; the mean premium for the chair was 8.0% premium; and the mean premium for the table was 5.6%. This pattern of the percentage premium—declining as the base product price increases—is similar to the findings from previous studies that have examined wood products of similar cost.

Whereas a substantial segment of the wood products market is willing to pay a positive premium, the premium was insensitive to the scope of the certification. This result is somewhat surprising, because the complete supply-chain certification offered by the “full” certification program represents greater potential benefits to the environment; thus, it would be expected that consumers would place a greater value on the certified product. The finding points to several possibilities. First, it could reflect consumers’ doubts about the ability of certification organizations to monitor environmental management practices throughout the market channel. Second, it could reflect that consumers place the greatest value on environmental management practices at the timber growing and harvesting level of the market channel. Finally, it could point to the importance of effective education programs regarding certification programs that will outline how monitoring is performed at each stage of the market channel and the potential benefits to the environment.

At this time, firms considering adoption of environmental certification of their products may wish to focus on certification of timber growing and harvesting, rather than focusing on certification at other stages of processing and handling. Perhaps if the market can be developed through educational programs regarding the potential benefits of certification throughout the market channel, then there may be economic benefits to firms from further certification. It should be noted that this study was done in only two states, Pennsylvania and Tennessee. Future

research should likely address potential regional differences in market participation and WTP for certified products.

As with all contingent market studies, consumers' stated purchasing decisions may not be borne out in the marketplace. While measures were taken in this study to help respondents make a realistic choice in a hypothetical situation, as the markets for environmentally certified products become more developed, the actual preferences of consumers may be differ somewhat from the stated preferences examined in this study. This highlights the need for market studies as consumers become more aware of certified products and these products are more readily available on the market.

References

- Blamey, R., J. Bennett, and M. Morrison. 1999. Yea-saying in contingent valuation surveys. *Land Econ.* 75:126-141.
- Boyle, K.J., H.F. MacDonald, H. Cheng, and D.W. McCollum. 1998. "Bid Design and Yea Saying in Single-Bounded Dichotomous-Choice Questions. *Land Econ.* 74(1):49-64.
- Cabarle, B., J. Cashwell, M. Coulumbe, J. Mater, W. Stuart, D. Winthaler, and L. Hill. 1995. Forest certification. *J. For.* 93(4):6-10.
- Carter, D. and F. Merry. 1998. The nature and status of certification in the United States. *For. Prod. J.* 48(2):23-28.
- Cooper, P. 1996. Certification and the Forest Stewardship Council. *Qrtrly. J. For.* 90(4):290-292.
- Cummings, R. and L. Taylor. 1999. Unbiased value estimates for environmental goods: A cheap talk design for the contingent valuation method. *Amer. Econ. Rev.* 89(3):649-665.
- Dillman, D. 2000. *Mail and Internet Surveys : The Tailored Design Method*. John Wiley and Sons, New York. 464 p.
- Forsyth, K., D. Haley, and R. Kozak. 1999. Will consumers pay more for certified wood products? *J. For.* 99(2):18-22.
- Greene, W. 2000. *Econometric Analysis*. MacMillan Publishing Company, New York. 1004 p.
- Grönroos, J. and J. Bowyer. 1999. Assessment of the market potential for environmentally certified wood products in new homes in Minneapolis/St. Paul and Chicago. *For. Prod. J.* 49(6):28-34.
- Jacobsen, M. 2000. Economic Contribution of Forestry to Pennsylvania. Pennsylvania State University, School of Forest Resources. Accessed at <http://rnrext.cas.psu.edu/counties/extmap.htm>, May 2002.
- Kiker, C. and F. Putz. 1997. Ecological certification of forest products: Economic challenge. *Ecol. Econ.* 20:37-51.
- Kriström, B. 1997. Spike models in contingent valuation. *Amer. J. Agric. Econ.* 79(3):1013-1023.
- Kotchen, M. and S. Reiling. 1999. Do reminders of substitutes and budget constraints influence contingent valuation estimates? Another comment. *Land Econ.* 75:478-482.

- Ozanne, L. and P. Smith. 1998. Segmenting the market for environmentally certified wood products. *For. Sci.* 44(2):379-389.
- Ozanne, L. and R. Vlosky. 1997. Willingness to pay for environmentally certified wood products: a consumer perspective. *For. Prod. J.* 47(6):39-48.
- Ozanne, L., H. Bigsby, and R. Vlosky. 1999. Certification of forest management practices: The New Zealand customer perspective. *New Zeal. J. of Forestry* (February):17-23.
- Pennsylvania Hardwood Development Council. 2001. Forest Facts. Accessed at http://sites.state.pa.us/PA_Exec/Agriculture/bureaus/hardwoods/hw_facts.html. May 2002.
- Rameststeiner, E. 1999. The attitude of European consumers towards forests and forestry. *Unasylva*. 196(50): 42-28.
- Sedjo, R.A. and S.K. Swallow. 2002. Voluntary Eco-Labeling and the Price Premium. *Land Econ.* 78(2):272-284.
- Spinazze, M. and S. Kant. 1999. Market potential for certified forest (wood) products in Ontario, Canada. *For. Chron.* 75(1):39-47.
- Stevens, J., M. Ahmad, and S. Ruddell. 1998. Forest products certification: A survey of producers and manufacturers. *For. Prod. J.* 48(6):43-52.
- US Census Bureau. County Population Estimates as of July 1, 1999. <http://eire.census.gov/popest/data/counties.php>. Accessed May 2002.
- US Census Bureau. Housing Vacancies and Homeownership Annual Statistics: 2001. <http://www.census.gov/hhes/www/housing/hvs/annual01/ann01t13.html>. Accessed May 2002.
- US Census Bureau. State and County Quick Facts. <http://quickfacts.census.gov/qfd/states/42000.html>. Accessed May 2002.
- USDA For. Serv. Timber Product Output Database Retrieval System as of 1996. <http://srsfia.usfs.msstate.edu/rpa/tpo/>. Accessed May 2002.
- Welch, T. 1998. Moving Beyond Environmental Compliance: A Handbook for Integration Pollution Orevention with ISO 14000. Lewis Publishers, Boca Raton. 240 p.
- Winterhalter, D. and D. Cassens. 1993. Telling the sustainable forest from the trees. *Furniture Design and Manufacturing* 65(8):101-106.

Table 1. Variable names and definitions.

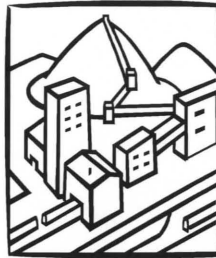
Variable Names	Definitions	Mean
<i>Age</i>	Age, in years	48.9 years
<i>Male</i>	1 if male, 0 otherwise	55.4%
<i>Urban</i>	1 if urban area, 0 otherwise	50.2%
<i>Environmental Advocate</i>	1 if contributed time or money to an environmental advocacy organization, 0 otherwise	39.1%
<i>Hunting/Fishing Advocate</i>	1 if contributed time or money to hunting or fishing organization, 0 otherwise	30.4%
<i>Forest User</i>	1 if use forests for recreation purposes at least once per month or more, 0 otherwise	43.2%
<i>Bought Eco-Certified Products in Past</i>	1 if yes, 0 otherwise	58.7%
<i>TN Resident</i>	1 if a Tennessee resident, 0 otherwise	49.4%
<i>Full</i>	1 if "full" certification program, 0 otherwise	50.6%
<i>Price</i>	Premium faced by respondent for the eco-certified wood product	See footnote 5

Table 2. Spike Models for Three Certified Wood (Oak) Products

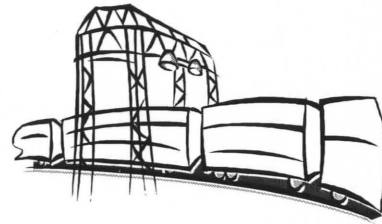
Variable	Shelf		Chair		Table	
	beta	t-ratio	beta	t-ratio	beta	t-ratio
<i>Intercept</i>	-2.775	-6.867	-3.092	-7.652	-3.000	-7.397
<i>Environmental Advocate</i>	0.616	4.027	0.666	4.365	0.602	3.930
<i>Forest User</i>	0.854	5.230	0.892	5.392	0.846	5.111
<i>Hunting/Fishing Advocate</i>	-0.084	-0.480	-0.123	-0.695	-0.046	-0.259
<i>TN Resident</i>	0.018	0.121	0.037	0.253	-0.012	-0.081
<i>Male</i>	-0.428	-2.841	-0.351	-2.320	-0.315	-2.085
<i>Age</i>	0.019	3.417	0.020	3.713	0.019	3.468
<i>Urban</i>	0.374	2.364	0.390	2.438	0.421	2.609
<i>Bought Eco-Certified Products in Past</i>	0.655	3.842	0.772	4.508	0.714	4.179
<i>"Full" Cert. Treatment</i>	0.053	0.368	0.149	1.029	0.179	1.224
<i>Price</i>	0.090	9.551	0.021	9.087	0.007	7.996
Ln-L	-721.381		-701.781		-690.700	
WTP	\$3.74 (\$0.42 s.e.)		\$15.94 (\$1.91 s.e.)		\$45.07 (\$5.92 s.e.)	
% Premium	13.0%		8.0%		5.6%	
Observations	973		969		967	



Timber Growing
& Harvesting is
Environmentally
Certified



Product
Manufacturing is
Environmentally
Certified

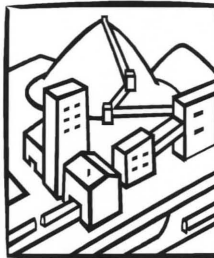


Product Handling is
Environmentally
Certified

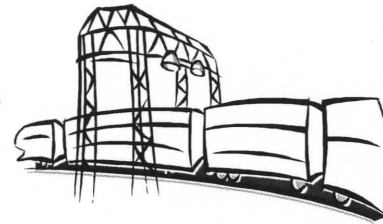
“Full” certification program



Timber Growing
& Harvesting is
Environmentally
Certified



Product Manufacturing
is NOT Environmentally
Certified



Product Handling is
NOT Environmentally
Certified

“Partial” certification program

Figure 1. Diagrams depicting “Full” and “Partial” certification programs.

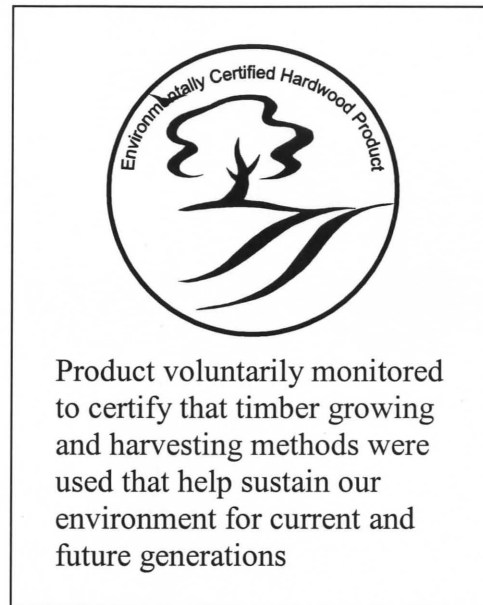


Figure 2. Example environmental certification label ("Partial" certification program).